

REMARKS

Claims 1-3 and 6-17 are pending.

Statement of Substance of Interview

As an initial matter, counsel wishes to express his appreciation for the courtesies extended by the Examiner at the interview on March 27, 2007.

At the interview, counsel and the Examiner discussed the evidence presented in the Declaration Under 37 C.F.R. § 1.132 filed on October 16, 2006 and the significance of the presently claimed resist's dry etching resistance and resistance to cracking in the thermal flow process. Counsel and the Examiner also discussed the relevance of In re Nolan, 553 F.2d 1261, 1267, 193 USPQ 641, 645 (CCPA 1977), In re May, 574 F.2d 1082, 197 USPQ 601 (CCPA 1978), and In re Eli Lilly, 902 F.2d 943, 14 USPQ2d 1741 (Fed. Cir. 1990), to the patentability of the present invention.

The Examiner invited Applicants to present arguments in writing and to address the sensitivity issue raised by the Examiner.

Patentability Over Uetani et al '070 and Kodama et al '415

In Paragraph No. 7 of the Action, claims 1-3 and 6-17 are rejected under 35 U.S.C. §103(a) as allegedly being unpatentable over Uetani et al (US 2001/0044070 A1) in view of Kodama et al (US 2003/0017415 A1).

Applicants submit that this rejection should be withdrawn because Uetani et al '070 and Kodama et al '415 do not disclose or render obvious the positive resist composition of the present invention, either alone or in combination.

As explained at pages 2-4 of the Response filed April 24, 2006, Uetani et al and Kodama et al do not render the positive resist composition of the present invention prima facie obvious, and the present claims are patentable over their disclosures.

Even if a prima facie case of obviousness could be established based on Uetani et al and Kodama et al, Applicants have submitted a Declaration Under 37 C.F.R. § 1.132 of Mr. Shinichi Kanna which shows that the present invention provides unexpectedly superior results in comparison to Example 1 of Uetani et al, the closest prior art. These superior results rebut any prima facie case of obviousness and demonstrate the patentability of the present invention over Uetani et al and Kodama et al.

In response, the Examiner states:

With respect to the rejection under 35 U.S.C. § 103(a) based on Uetani et al in view of Kodama et al, the Examiner maintains the present invention is obvious in view of said combination. The declaration evidence submitted by Applicant is unpersuasive because, although the results obtained are arguably superior and unexpected with respect to cracking and dry etch resistance, Applicant has not establish[ed that] said results have a significan[ce] that is equal to or greater than the expected beneficial result of sensitivity. See MPEP § 716.02(c) and *In re Nolan*, 553 F.2d 1261, 1267, 193 USPQ 641, 645 (CCPA 1977).

In response, Applicants submit that the superior results obtained with the present resist composition with respect to dry etching resistance and resistance to cracking in the thermal flow process are as significant or more significant in the present context than any allegedly expected beneficial result pertaining to sensitivity.

The first question is what one of ordinary skill would expect, if anything, in terms of sensitivity, when employing Kodama et al's preferred combination of a triarylsulfonium salt PAG and a phenacylsulfonium salt PAG in Uetani et al's resist composition. The Examiner

asserts that it would have been obvious to use “the preferred combination of Kodama et al., a triarylsulfonium salt and a phenacylsulfonium salt ([0110]-[0115]) with reasonable expectation of preventing sensitivity fluctuation ([0116]).” (emphasis added). However, the cited paragraphs of Kodama et al do not support the conclusion that this is what one of ordinary skill would expect.

Paragraph [0115] of Kodama et al relates to the amounts of the PAGs that are used in the resist composition, and essentially says that if not enough PAG is employed, “[the] generating amount of an acid becomes insufficient and the sensitivity is liable to lower.”

Paragraph [0116] of Kodama et al pertains to the weight ratio of the respective PAGs to be employed, and gives preferred ranges for the weight ratio “[f]rom the point of side lobe margin.” Kodama et al state earlier in their description that “When a half tone phase shift mask is used, there is a problem of a side lobe caused by the dissolution of a pattern part with a trace amount of transmitted light, and the solution of this problem has been desired.” Kodama et al at [0009]. Kodama et al state that an object of their invention, among other things, is to provide a resist composition “hardly generating side lobe in pattern-forming using a half tone phase shift mask.” Kodama et al at [0014].

While Kodama et al also speak of a desire for “preventing sensitivity fluctuation due to aging storage,” among many others, see Kodama et al at [0016], they do not appear to attribute any improvements in this regard to their particular combination of PAGs.

However, even assuming that one of ordinary skill in the art would have expected some improvement in “side lobe margin” or in sensitivity fluctuation by employing Kodama et al’s particular combination of PAGs in Uetani et al’s resist composition, the superior results obtained

with the present resist composition in terms of dry etching resistance and resistance to cracking in the thermal flow process are as significant or more significant, in the present context. This is particularly true in the case of dry etching resistance.

As explained at page 1 of the present specification, the present invention relates to a positive resist composition “suitable for uses with an exposure light source of emitting light of 250 nm or less. . . .” For contemporary resists, such a light source is typified by an ArF excimer laser (193 nm). See, e.g., page 2, second paragraph of the specification. An ArF excimer laser is employed in the working Examples of the present application. See page 129 of the specification.

In support of their position and the patentability of the present invention, Applicants submit herewith the following publication: Kurt Ronse, On the Maturity of ArF Resists: When Can they be Implemented in Manufacturing?, Future Fab Intl. Volume 10, July 1, 2001. Dr. Ronse has an M.S. Degree and PhD in Electrical Engineering from the University of Leuven, Belgium. As his bio, submitted herewith, indicates, he has authored and co-authored over 60 publications and conference contributions in the field of optical lithography.

In his article, Dr. Ronse discusses the history of ArF resists, chemistry approaches for ArF resists, imaging performance, and what he calls “Process integration challenges of ArF resists.” The first and most important problem he discusses with ArF resists is dry etch resistance. Ronse at page 5. He states: “The dry etch resistance of ArF [resists] has so far been a major issue.” Id. (emphasis added). He states that certain types of ArF resists “have recently shown improvements in etch resistance,” but “are still far worse in etch resistance compared to [prior generation] I-line and state-of-the-art KrF resists.” Id. He questions “whether ArF resists will ever reach the dry etch resistance of I-line or KrF resists.” Id.

The other problems Dr. Ronse identifies with ArF resists, in order, are: (2) Line edge roughness (LER); (3) Linewidth sensitivity to the PEB (post-exposure bake) temperature; (3) Adhesion, particularly on inorganic substrates; and (4) Shrinkage under SEM inspection. The Examiner will kindly note that Dr. Ronse does not state that either sensitivity fluctuation or side lobe margin are significant problems associated with ArF resists.

Applicants submit that Dr. Ronse's article establishes that, in the context of the present invention, unexpectedly superior dry etching resistance, as has been shown here in the Rule 132 Declaration filed October 16, 2006, is at least as important, if not more important, than any alleged improvements in sensitivity which one of ordinary skill might expect from employing Kodama et al's combination of PAGs in Uetani et al's resist composition.

While Dr. Ronse's article does not discuss cracking resistance, this is not surprising, because he does not discuss thermal flow processes. The thermal flow process is a technique of shrinking patterns which is being studied in the field; it is not an everyday process in this art. See page 3, last paragraph of the specification. The present inventors do contemplate their resist composition as being useful in thermal flow processes, and, in that context, it should be self-evident that cracking resistance is at least as important as sensitivity, which is a property generally required of any resist. See page 51, lines 14-15 of the present specification.

As to the law, MPEP § 716.02(c) pertains to weighing evidence of expected and unexpected results. It states that evidence of unexpected results must be weighed against evidence supporting prima facie obviousness in making a final determination of the obviousness of the claimed invention. Citing the Nolan case, the MPEP states that where the unexpected properties of a claimed invention are not shown to have a significance equal to or greater than

the expected properties, the evidence of unexpected properties may not be sufficient to rebut the evidence of obviousness.

In Nolan, the claims were directed to a display/memory device which was prima facie obvious over the prior art. The court found that a higher memory margin and lower operating voltage would have been expected properties of the claimed device, and that a higher memory margin appeared to be the most significant improvement for a memory device. Although the Applicant presented evidence of unexpected properties with regard to lower peak discharge current and higher luminous efficiency, these properties were not shown to have a significance equal to or greater than that of the expected higher memory margin and lower operating voltage. The court held that the evidence of non-obviousness was not sufficient to rebut the evidence of obviousness.

In Applicants' view, the Nolan case and the other cases discussed in MPEP 716.02(c) simply stand for the proposition that patentability under § 103 must be determined based on the entire evidence, on a case by case basis. For example, the court in Nolan stated:

Considering all of the evidence, we are not persuaded that the evidence of the unexpected higher luminous efficiency and lower peak discharge current rebuts the strong showing of obviousness. [Citations omitted.] The expected higher memory margin is of particular significance since it appears to be the most significant improvement for a memory device. Appellant has not shown that the unexpected lower peak discharge current and higher luminous efficiency have a significance equal to or greater

than that of the expected higher memory margin and lower operating voltage. We recognize that this court has held claims to be unobvious where the prior art suggested the claimed structure and some of its properties but other properties were unexpected.

In re Murch, 59 CCPA 1277, 464 F.2d 1051, 175 USPQ 89 (1972). In Murch, the court considered all of the evidence of unobviousness and concluded that it rebutted the evidence of obviousness. Here the evidence of unobviousness does not rebut the evidence of obviousness.

193 USPQ at 645. Applicants note that the particular phraseology used by the court in Nolan in support of its decision --that is, the reference to a showing that the unexpected results “have a significance equal to or greater than” that of any expected results-- has not been picked up and employed by the courts in subsequent decisions.

The court in Nolan stated that the expected higher memory margin was of particular significance “since it appears to be the most significant improvement for a memory device.” Here, the Examiner states that an expected beneficial result is improved sensitivity. Even assuming that this is true, Applicants have shown based on Dr. Ronse’s publication that dry etching resistance is at least as significant, if not more significant, than sensitivity, in the present context. Dry etching resistance is a “major issue” for ArF resists. Ronse, *supra*. This is consistent with the present specification, which states that conventional resist compositions in this field have problems in terms of dry etching resistance or suffer from generation of cracking in the thermal flow process, and that an advantage of the claimed resist is that it provides a resist

composition excellent in dry etching resistance and also reduced in the generation of cracking in the thermal flow process. It is these improved properties which are the focus of the present application.¹

Thus, considered in its entirety, the evidence of record supports the patentability of the present resist.

MPEP 716.02(c) also discusses the well-known In re May case. In May, evidence that a compound was unexpectedly nonaddictive was sufficient to overcome an obviousness rejection. Although the claimed compound also had the expected result of potent analgesia, there was evidence of record showing that the goal of research in this area was to produce an analgesic compound which was nonaddictive, enhancing the evidentiary value of the showing of nonaddictiveness as an indicia of nonobviousness.

Here, as in May, there is evidence (i.e., Dr. Ronse's publication) showing that a goal of research in the ArF photoresist area is to produce a photoresist which has improved dry etching resistance. Dr. Ronse's article enhances the evidentiary value of the previously submitted Rule 132 Declaration as evidence of nonobviousness. See May, supra.

The Examiner will also kindly note the In re Eli Lilly case cited in the MPEP. In justifying its decision upholding the Board's conclusion of obviousness, the CAFC stated that the

¹ In the Response filed April 24, 2006, Applicants argued that the prevention of sensitivity fluctuation is an effect of the present invention. Applicants have advised that that argument was in error, and it is hereby withdrawn. In the present invention, cracking and dry etching resistance are the problems to be solved, and the effects, as shown in the present specification. The present invention has been made particularly for solving problems associated with cracking and dry etching resistance, and it is apparent from the present specification that these properties are a major aspect of the present invention.

evidence did not show that a “significant aspect” of the claimed invention would have been unexpected. Here, in contrast to Lilly, Applicants have shown that improved dry etching resistance and reduced crack generation in thermal flow processes are significant aspects of the claimed invention.

Finally, at the March 27 interview, the Examiner indicated that she would like to see more detail with respect to the first full sentence on page 3 of the Declaration of record, particularly what is meant by the “at least two species” referred to. While the Declaration is believed to be clear as it stands, Applicants have advised the phrase “at least two species” corresponds to the description in claim 1. Specifically, claim 1 recites that at least two kinds of “the compound (B)” are included in the composition, i.e., a triarylsulfonium salt compound and a phenacylsulfonium salt compound.

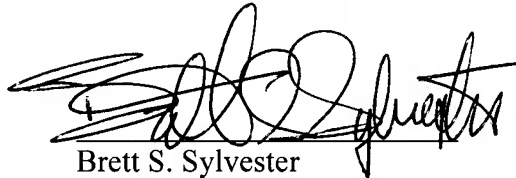
In view of the above, reconsideration and withdrawal of the § 103(a) rejection of claims 1-3 and 6-17 based on Uetani et al '070 in view of Kodama et al '415 are respectfully requested.

Reconsideration and allowance of this application are now believed to be in order, and such actions are hereby solicited. If any points remain in issue which the Examiner feels may be best resolved through a personal or telephone interview, the Examiner is kindly requested to contact the undersigned at the telephone number listed below.

Response Under 37 C.F.R. § 1.116
U.S. Appln. No.: 10/802,808

The USPTO is directed and authorized to charge all required fees, except for the Issue Fee and the Publication Fee, to Deposit Account No. 19-4880. Please also credit any overpayments to said Deposit Account.

Respectfully submitted,

A handwritten signature in black ink, appearing to read "Brett S. Sylvester", written over a horizontal line.

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